Claims

1. A method of equalizing a transmission characteristic of a signal processing circuitry (200), said method comprising the steps of:
   a) obtaining a difference between an output signal of said signal processing circuitry (200) and an input signal of an equalizing function (15);
   b) approximating a gradient of said difference based on said obtained difference and an approximation of said transmission characteristic; and
   c) updating control values of said equalizing function (15) based on said approximated gradient.

2. A method according to claim 1, wherein said approximating step comprises the step of calculating an approximation of a least mean square gradient vector of said difference.

3. A method according to claim 2, wherein said gradient vector is calculated from a partial differential equation of a system cost function.

4. A method according to any one of the preceding claims, wherein said difference is obtained by comparing signal envelopes of said output and input signals.

5. A method according to claim 4, wherein said input signal is a digital signal and said output signal is an analog signal.

6. A method according to any one of the preceding claims, wherein said control values are coefficients of an adaptive digital filter.

7. A method according to any one of the preceding claims, wherein said transmission characteristic is approximated as a delay function.

8. A method according to claim 7, wherein the delay of said delay function corresponds to the position of the maximum analog filter peak of said transmission characteristic.

9. A method according to claim 8, wherein said gradient vector is calculated using the following equation:

$$\nabla\{E\} = -2e[k] \cdot \underline{d}[k - \tau],$$

wherein
$\nabla\{E\}$ denotes said gradient vector,
$e[k]$ denotes said obtained difference, and
$\underline{d}[k - \tau]$ denotes a vector representation of said input signal assessed by said delay approximation of said transmission characteristic.

10. A method according to claim 9, wherein filter coefficients are updated in said updating step based on the following equation:

$$\underline{w}[k + 1] = \underline{w}[k] + \mu e[k] \cdot \underline{d}[k - \tau],$$

wherein
$\underline{w}[k + 1]$ denotes a vector representation of updated filter coefficients,
$\underline{w}[k]$ denotes a vector representation of current filter coefficients, and
μ denotes a predetermined proportionality factor.

11. An apparatus for equalizing a transmission characteristic of a signal processing circuitry (200), said apparatus comprising:
a) comparing means (71) for obtaining a difference between an output signal of said signal processing circuitry (200) and an input signal of an equalizing means (15);
b) approximation means (72) for approximating a gradient of said difference based on said obtained difference and an approximation of said transmission characteristic; and
c) updating means (72) for obtaining control values supplied to said equalizing means (15), based on said approximated gradient.

12. An apparatus according to claim 11, wherein said comparing means (71) are arranged to compare said input and output signals based on their envelopes.

13. An apparatus according to claim 11 or 12, wherein said approximation means (72) is arranged to approximate said transmission characteristic as a delay function and to approximate said gradient by using a least mean square approximation function.

14. An apparatus according to any one of claims 11 to 13, wherein said signal processing circuitry is a direct conversion or heterodyne transmitter architecture (200).

15. An apparatus according to any one of claims 11 to 14, wherein said apparatus comprises a digital pre-equalizer means (15).